CHAPTER 1
INTRODUCTION

The Hazard Ranking System Guidance Manual (HRSGM) provides general and technical guidance for individuals involved in determining Hazard Ranking System (HRS) scores and preparing HRS scoring packages. The HRSGM clarifies terms and concepts in the HRS, presents strategies and specific guidance for scoring selected HRS factors, and provides guidelines to assist in collecting and organizing relevant data. Although it is targeted primarily to HRS scorers and package prepares (frequently contractors or state agency staff), others involved in the U.S. Environmental Protection Agency's (EPA'S) site assessment process (e.g., package reviewers) may find parts of the document useful.

This document has certain limitations. The HRSGM does not account for the infinite ways in which conditions may vary from one site to another. Thus, all parts of the guidance may not apply to every site. Scorers should consider Site- specific conditions and consult, as appropriate, the EPA Region's National Priorities List (NPL) Coordinator, the Regional Site Assessment Manager, the Site Assessment Regional Coordinator at EPA Headquarters, Quality Assurance (QA) staff, field investigators, and other personnel associated with the site assessment process. The HRSGM focuses on scoring guidance, such as where to find information and how to calculate factor values, rather than on documentation requirements for HRS scoring packages. Additionally, the HRSGM is not intended to be an all-inclusive reference. No specific guidance is provided, for example, on scoring procedures for radioactive substances or on the ground water to surface water component of the surface water pathway. The HRS, published as a Federal regulation on December 14, 1990 (55*Federal Register* 51532), constitutes the definitive reference and should be consulted throughout the process of scoring a site.

The remainder of this introductory chapter presents overviews of the HRS and the Superfund process, describes the content and organization of the HRSGM, and indentifies several related site assessment guidance documents and scoring tools.

1.1 INTRODUCTION TO THE HRS

The HRS is the scoring system used by the EPA's Superfund program to assess the relative threat associated with actual or potential releases of hazardous substances. The HRS is the primary screening tool for determining whether a site is to be included on the NPL, EPA's list of sites that are priorities for further investigation and, if necessary, response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601,*et seq*. An HRS score for a site is determined by evaluating four pathways:

- Ground water migration;
- Surface water migration (composed of the three threats — drinking water, human food chain, and environmental);
- Soil exposure (composed of two threats — resident population and nearby population); and
- Air migration.

The scoring system for each pathway is based on a number of individual factors grouped into three factor categories: (1) likelihood of release (or, for the soil exposure pathway, likelihood of exposure); (2) waste characteristics; and (3) targets. Individual factors are evaluated and the factor values are combined mathematically to produce factor category values. To obtain a pathway score (e.g., the ground water migration pathway score) the factor category values are multiplied and then normalized to 100 points. In the case of the surface water migration and soil exposure pathways, scores are calculated for each threat and then added to yield the pathway score. The HRS site score, which ranges from 0 to 100, is obtained by combining the four pathway scores using the following root-mean-square equation:

$$S = \sqrt{\frac{S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2}{4}}$$

where: S = site score
S_{gw} = ground water migration pathway score
S_{sw} = surface water migration pathway score
S_s = soil exposure pathway score
S_a = air migration pathway score

Under this equation, higher scoring pathways have a greater relative impact on the overall site score than lower scoring pathways. Section 3.4 explains the mathematics of scoring in more detail.

Any site scoring 28.50 or greater is eligible for the NPL. This score does not represent a specified level of risk, but is a cutoff point that serves as a screening-level indicator of the highest priority releases or threatened releases. Sites that score below 28.50 may be addressed under other Federal and state response authorities. Some sites that score above 28.50 may be addressed by other Federal programs.

1.2 OVERVIEW OF THE SUPERFUND PROCESS

The principal components of EPA's Superfund program are set forth in CERCLA, which was enacted in 1980 and amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and in the National Contingency Plan (NCP) (40 CFR 300). The Superfund program responds to threats posed by uncontrolled releases of hazardous substances into the environment.

CURRENT SUPERFUND PROCESS

The process by which EPA determines and implements the appropriate response to releases that require a remedial response action consists of two phases (see ***Highlight 1-1***):

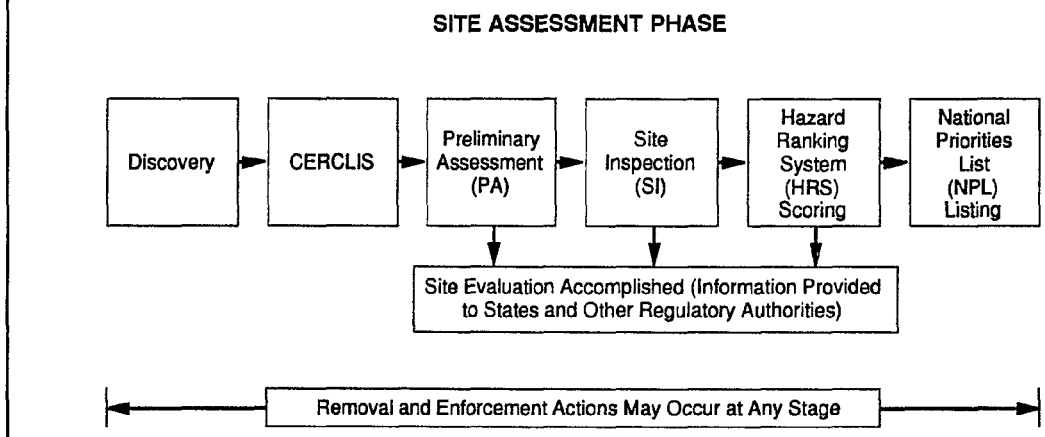
- Site assessment: screening-level evaluation of all sites to determine those for which response action may be required, culminating in the listing of sites on the NPL, where appropriate; and

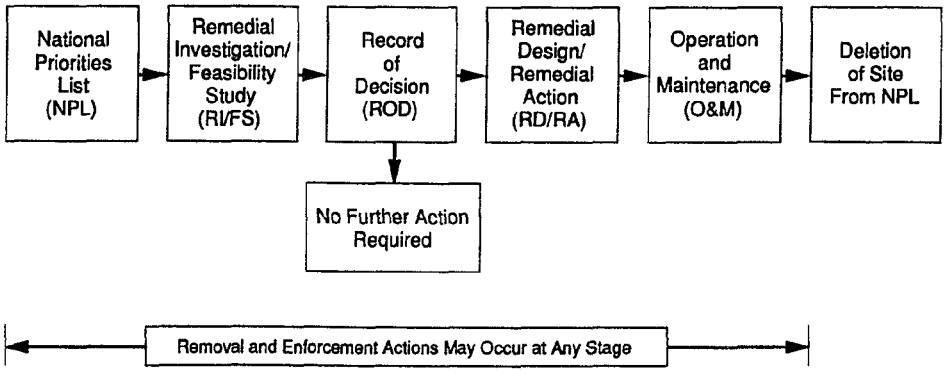
- Remedial response action: comprehensive evaluation of NPL sites to determine the nature and extent of contamination, and to select and implement any necessary site cleanups.

Releases that require immediate or short-term response actions are addressed under the removal portion of the Superfund program,

The site assessment phase begins with site discovery, or notification to EPA of possible releases of hazardous substances. Sites are discovered by various parties, including EPA Regional offices, state agencies, and citizens who petition EPA to perform a preliminary assessment. Once

HIGHLIGHT 1-1
THE SUPERFUND PROCESS





discovered, sites are entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), EPA's computerized inventory of potential hazardous substance release sites. EPA then evaluates the potential for a release of hazardous substances from the site during two investigative steps:

- Preliminary Assessment (PA): A PA is a limited-scope investigation performed on every CERCLIS site. PA investigators collect readily available information about a site and its surrounding area. The PA is designed to distinguish, based on relatively limited data, between sites that pose little or no threat to human health and the environment and sites that may pose a threat and thus require further investigation. The PA also identifies sites requiring assessment for possible emergency response (i.e., removal) actions.

- Site Inspection (SI): If the PA results in a recommendation for further investigation, an SI is performed. The objectives of the SI are to identify which sites have a high probability of qualifying for the NPL and to collect the data needed for HRS scoring and documentation. SI investigators typically collect environmental and waste samples to determine what hazardous substances are present at a site, whether they are being released to the environment, and whether they have reached nearby targets. The SI can be conducted in one stage or in two. The first stage, or focused SI, tests critical hypotheses developed during the PA and, in some cases, yields information sufficient to prepare an HRS scoring package. If further information is necessary to document an HRS score, an expanded SI is conducted.

Information collected during the PA and SI is used to calculate an HRS score. Sites with an HRS score of 28.50 or greater are eligible for listing on the NPL and require the preparation of a complete HRS scoring package, including a site narrative summary, Quality Control (QC) checklist, QA signature page, HRS scoresheets, HRS documentation record and references, and NPL characteristics data collection form. Section 3.2 discusses the HRS scoring package.

SUPERFUND ACCELERATED CLEANUP MODEL

EPA recently developed the Superfund Accelerated Cleanup Model (SACM) to increase the efficiency of the Superfund program by streamlining cleanup efforts at all Superfund sites. The traditional Superfund response follows a prolonged initial phase of study and assessment, while SACM is designed to combine immediate action with continuing study as necessary. SACM is a new process for new sites and an administrative improvement for processing existing sites.

SACM involves the following five elements: (1) a one-step screening and risk assessment at the beginning of the process; (2) Regional Decision Teams to serve as "traffic cops" for all sites to ensure quick yet thorough risk reduction; (3) early actions to reduce immediate risk to human health and the environment; (4) long-term actions to address sites expected to require more than five years to clean up; and (5) a combination of enforcement, community relations, and public involvement throughout the process. Benefits of SACM include measuring success by total risk reduction at all Superfund sites and making long-term restoration a separate activity. SACM will restore public confidence through early risk reduction, balancing priorities by cleaning up the worst sites first, and cleaning up a large number of sites.

Under SACM, EPA can institute actions to address threats to health and safety of the surrounding population and environment as soon as those threats are identified, using removal action authority or early remedial action authority. The remedial action can be long-term, such as ground water restoration, or short-term, such as soil treatment. Whenever possible, Superfund assessment activities should be conducted concurrently with short-term removal and long-term remedial actions. For instance, under SACM EPA may decide to conduct the SI and the remedial investigation, which previously were separate activities, as a single investigation at sites that are expected to require significant response action.

Consistent with the NCP, listing sites on the NPL will continue to be a prerequisite to using certain remedial action authorities to clean up sites. The HRS will continue to be the primary basis for selecting sites for the NPL.

1.3 ORGANIZATION OF THE HRSGM

The HRSGM is organized in two parts. The first provides guidance on broad policy issues and an introduction to the site scoring process. These chapters, intended to be read through in their entirety, are:

- Chapter 1: Introduction
- Chapter 2: Policy and Statutory Issues
- Chapter 3: The HRS Scoring Process.

The second part of the HRSGM provides specific, detailed guidance on various topics important to HRS scoring. Each section within these chapters addresses a particular topic and provides self-contained guidance. Chapters need not be read in their entirety, but rather are intended to be used primarily as reference material for specific topics, or to answer specific questions. Chapters 4 through 6 and Appendix A provide guidance on topics that relate to more than one HRS pathway:

- Chapter 4: Sources
- Chapter 5: Observed Releases
- Chapter 6: Hazardous Waste Quantity
- Appendix A: Sensitive Environments.

Chapters 7 through 10 address the four HRS pathways:

- Chapter 7: Ground Water Pathway
- Chapter 8: Surface Water Pathway
- Chapter 9: Soil Exposure Pathway
- Chapter 10: Air Pathway.

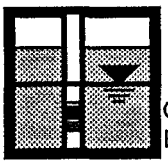
A typical section in Chapters 4 through 10 contains the following subsections:

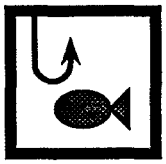
- Introduction: a brief overview of the topic, including its context within the HRS.
- Relevant HRS Sections: a text box referencing relevant HRS section numbers and titles.
- Definitions: a subsection defining and clarifying important terms, particularly those with HRS-specific definitions.
- How to Score (or How to Evaluate): step-by-step instructions for scoring and/or evaluating the relevant factors or topics.
- Topic Icons: graphics in the top right-hand corner of the first page of each section, indicating the topic(s) (e.g., air pathway, targets) covered in the section. ***Highlight 1-2*** provides a listing of all the icons.

Sections may also include:

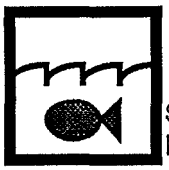
- Tips and Reminders: bullet points that present strategies for efficient scoring and data collection, identify common mistakes, and restate key issues.

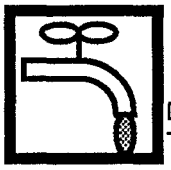
HIGHLIGHT 1-2
ICONS FOR HRS PATHWAYS, THREATS, AND FACTOR CATEGORIES


Ground Water Pathway

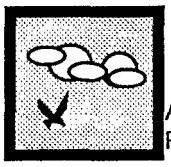

Human Food Chain Threat

Waste Characteristics


Surface Water Pathway


Drinking Water Threat

Targets


Air Pathway


Environmental Threat

Likelihood of Release


Soil Exposure Pathway

- Highlights: text boxes providing reference tables, figures, or other related information, such as examples of how to score particular factors under certain, specified circumstances or a listing of reference data commonly used to score particular factors and suggesting where to obtain such data.

An index is included at the beginning of the document that cross references HRS rule section numbers with relevant HRSGM Sections.

1.4 RELATED SITE ASSESSMENT GUIDANCE MATERIALS

In addition to the HRS rule and this guidance document, EPA has developed several other documents and scoring tools to assist investigators with various aspects of the site assessment process. These include:

- PA Guidance
- SI Guidance
- QC Guidance for NPL Candidate Sites
- PREscore and PA-Score Computer Software and Users Manuals
- Data Useability Guidance for Site Assessment (under development).

Highlight 1-3 compares the audience and scope for each of these site assessment guidance documents and scoring tools.

Other information about the HRS is available through several "Quick Reference Fact Sheets" prepared by EPA:

- *The Revised Hazard Ranking System: An Improved Too/ for Screening Superfund Sites* (OSWER Publication 9320.7-01 FS, November 1990);
- *The Revised Hazard Ranking System: Qs and As* (OSWER Publication 9320.7-02FS, November 1990);
- *The Revised Hazard Ranking System: Background Information* (OSWER Publication 9320.7-03FS, November 1990); and
- *The Revised Hazard Ranking System: Evaluating Sites After Waste Removals* (OSWER Publication 9345.1-03FS, October 1991).

HIGHLIGHT 1-3
SITE ASSESSMENT GUIDANCE DOCUMENTS AND SCORING TOOLS

Guidance Document	Guidance for Performing Preliminary Assessments Under CERCLA	Guidance for Performing Site Inspections Under CERCLA	Data Useability Guidance for Site Assessment	Hazard Ranking System Guidance Manual	Regional Qualitity Control (QC) Guidance for NPL Candidate Sites	PREscore Users Manual and Tutorial / PA-Score Users Manual and Tutorial
Reference #	9345.0-01A	9345.1-05	9345.1-06	9345.1-07	9345.1-08	9345.1-04 (PREscore) 9345.1-11 (PA-Score)
Status/Date	Final/September 1991	Interim Final/ September 1992	Under Development	Interim Final/ November 1992	Final/December 1991	Ver 1.1/July 1992 (PREscore) Ver 2.0/July1992 (PA-Score)
Primary Audience	PA Investigations	SI Investigators	Field Technicians, Data Reviewers, and Data Analysts	HRS Scores,EPARegional Staff	EPA Regional Staff, HRS Scorers	HRS Scorers
Scope and Content	Provides instructions for conducting PAs and reporting the results, including: determining CERCLA eligibility; information required to evaluate a site; how and where to find such information; how to conduct a site reconnaissance; how to evaluate a PA site; and reporting requirements, format, content, and review. The purpose of this document is to assist PA investigators in conducting high-quality assessments that result in correct site recommendations on a nationally consistent basis.	Provides guidance for the SI scoping, planning, and sampling strategies. The document addresses focused SI and expanded SI activities, including development of field work plan, sampling strategies, data analysis and scoring reviews, and report preparation. The purpose of this document is to assist SI investigators in conducting efficient, high-quality SIs that result in correct site recommendations on a nationally consistent basis.	Focuses on the collection, interpretation, and useability of chemical analysis data to support the scoring of sites under the HRS.	Provides general and technical guidance for prepares of an HRS scoring package. Guidance includes: general approach to scoring, clarification of terms and concepts in the rule, general policy issues, and specific guidance for scoring selected factors in all pathways.	Provides required and recommended procedures for an EPA Regional QC program for HRS packages. This guidance is intended to standardize Regional QC review and improve HRS package quality. The document provides a checklist that must be reviewed prior to submitting the HRS documentation to Headquarters. It also provides guidance on a number of policy issues, including site definition, the CERCLA petroleum exclusion, and the RCRA policy.	The PREscore Users Manual and Tutorial provides instuctions for installing PREscore on a computer and a step-by-step lesson on the use of PREscore The computer program calculates HRS scores, assists in creating documentation for HRS scoring packages, and provides excerpts of the HRS. The PA-Score Users Manual and Tutorial provides instructions on installing PA-Score on a computer and step-by-step lessons on the use of PA-Score. The computer program performs calculations to determine the PA score. See also ***Highlight 3-1*** for a more detailed description of PREscore.